Pre-ambulation /Test Socket Setup

Observation ➤ Corrective Measure

Sagittal Plane Alignment recommendations* not achieved in setup.

*pylon vertical, 20mm posterior offset of main axis from sagittal plane reference line

Socket Angle: Sagittal Plane

- Accommodates contracture + 3-5º of flexion
- Ensure hip flexor activation/stretch occurs after forefoot loading on prosthetic side
- *Translate* knee posterior to achieve required offset

Initial-Ambulation Assessment

Observation ➤ Corrective Measure

Assistive Device Usage

Crutch or Cane on uninvolved side =
- lean to device side

Walker =
- forward trunk lean

Parallel bars =
- forward trunk lean
- device used for partial weight support

Device & Amputee Corrections

Crutch or Cane
- Switch to usage on involved side

Walker
- Cue activation of abdominal and gluteal muscles

Parallel bars =
- Cue activation of abdominal and glute muscles
- Cue to reduce use of bars for weight support

Poor Proprioception

Unawareness of knee reaching full extension in swing phase

Knee Adjustment

Increase terminal impact
- Switch from white to red spring
- If friction was increased, reduce, but no further than factory setting.

Gait and postural deviations during Ambulation

Misaligned Posture (e.g. Lordosis etc when ambulating)

Weight Shifting
Vaulting
Hip Hiking
Uneven step lengths
Passive hip extensors

Amputee Correction

Cue activation of abdominal and gluteal muscles

Specific/Key Examples

Observation	➔	Corrective Measure

New patient/K2/using walker

- Leaning forward, butt out.
- Walker used for weight support
- Weak hip flexors

➔

Amputee Corrective Measure

Cue amputee to awareness of current posture

then cue to activate core

➔

Knee Adjustment

Remove friction mechanism
Install Red (high) Spring

K2 transitioning from WASC

Possible postural deficits

Possible delayed prosthetic heel strike

➔

Amputee Corrective Measure

Cue awareness of current posture

Then cue to activate core

➔

Knee Adjustment

Remove friction mechanism
+
Install Red Spring

High Activity Patient acclimated to MPK or S&S Knee

➔

Amputee Corrective Measure
Communicate adaptation period to Knee's lower resistance to flexion which will result in natural reduction in hip flexor force over time.

Active musculoskeletal activity throughout stance phase will be more energy efficient and promote proper usage of knee

➔

Knee Adjustment

Red Spring
Increase Friction

K2 acclimated to geometric locking or polycentric knees
non-sequential disengagement of knee
Lack of trust in prosthesis

➔

Amputee Corrective Measure
Communicate sequential steps of ATK disengagement

➔

Knee Adjustment
Red Spring
Remove Friction

K3 acclimated to geometric locking hydraulic swing knees

Possible acclimation to greater flexion resistance

➔

Knee Adjustment
Increase friction resistance

Amputation Levels

Observation	→	Corrective Measure

KD or Long TF

Good hip flexor/extensor control

High level of prosthetic knee swing phase extension force

→

Communicate:

Less hip flexor force needed.

Natural acclimation will occur

Bilateral TF

Inability or difficulty:
- sit to stand
- stand to sit

Poor Balance

Inclination to lean back in parallel bars

Inclination to keep hands in line with or behind pelvis on bars

→

Communicate:

Manual lock methods of engagement
Cover Release
Autolock function

- Practice standing in manual lock mode
- Practice sitting, unlocking and using cover release bilaterally
- Focus on correcting posterior leaning posture in parallel bars
- Practice static weight shifting side to side
- Practice static weight shifting front to back (back toe lined up with heel of other foot) while cueing correct posture
- Walk in parallel bars with both knees manually locked.
- Practice strong hip flexion by kicking bottle with other knee manually locked, switch sides

Knee setup: Red Spring, remove Friction Mechanism

Bilateral: TF + TT

Often favor TF side if knee stable due to discomfort w/ loading TT side anatomical knee

→

Amputee Correction

If TF first: generally quick progression

If TT first: must master TF mechanics without ability to favor other side.

Will need to develop strong ability to use & trust TF side

Amputation Levels

Observation

→

Corrective Measure

Hip Disarticulation

Inability or difficulty:
- sit to stand
- stand to sit

Poor Balance

Lack extremity to control prosthesis

→

Communicate:

Manual lock methods of engagement
Cover Release
Autolock function

- Practice standing in manual lock mode
- Practice sitting: load toe by twisting trunk, or sit with leg extended, unlocking and using cover release
- Practice static weight shifting side to side
- Practice static weight shifting front to back (back toe lined up with heel of other foot) while cueing correct posture
- Walk in parallel bars with knee manually locked.

Knee setup:
Alignment

The further posterior the knee center from the sagittal reference line, the easier it will be for the amputee to initiate flexion.

Alignment/placement of main axis of knee in sagittal plane must allow effective loading of toe prior to desired initiation point of stance phase knee flexion.

Swing Phase Settings
Most HDs will want a more free swinging knee
- white spring w factory friction
- white spring w/o Friction Mechanism
- red spring if insufficient pendulum effect with white spring

Pre-fitting Patient Hx Assessment

All Cases	→	Observation	→	Probable Action

Age/Mobility Level

Pre-Amputation activity level
predictor of potential
High mobility: greater functional potential, strength, balance, need for variable cadence response

Low mobility: reduced strength and balance need for assistive device, need for stability, need for robust extension

High Mobility:
Increase to red spring,
Increase friction

Low Mobility:
Increase to red spring,
Remove Friction unit

Amputation Level & Type

Short TF = poor hip flexor extensor control

Long TF/ KD: good hip flexor/extensor control / long lever arm

Note A/P but also ROM / M/L strength / stabilization (likely myoplasty)

Short TF:
Minimal friction or removal of friction mechanism. possible increase to red spring

Long TF/KD:
Increase to red spring
Increase friction

Time Since Amputation

Newer Amputee
• Socket fit may be variable
• Assure stump weight bearing capability

Ensure has distal contact w socket. if one way valve, open and palpate to assess.

If not, and time permits, have amputee ace-wrap or apply shrinker for 15-30 minutes prior to redonning

If distal and/or proximal discomfort, have patient try added sock ply.

Sealing liners - ensure proper sock and/or sealing fin placement on liner

Pre-fitting Patient Hx Assessment, Cont'd

All Cases	→	Observation	→	Probable Action

Cognitive Level / Mental Fatigue

→

Lack of understanding of:
- autolock at extension
- Autolock release requirements

→

- Education on AutoLock engagement and release
- use of simple cues understandable to amputee
- Practice stationary unloading
- Loosen friction
- Take breaks if mental fatigue

Hx of :
- Falls
- Gait Deviations
- Compliance

→

Determine reason for falls:
- Cognitive issues
- Noncompliance
- Balance issues
- Hip extensor weakness
- Hip Flexion Contracture
- Contralateral deficits
- Inappropriate component
- Selection
- Insufficient PT post-amputation

→

Educate on function and importance of gait pattern required

Ensure compensatory alignment modifications if needed (socket flexion while maintaining knee offset). Ensure patient is actually capable of exploiting functions of knee.

Other Comorbidities

→

- Cardiovascular capability
- Stump health & socket comfort
- Neurological involvement

→

Verify patient cability to ambulate without health risk and determine steps and rest sessions as needed
Neuromas and localized stump pain independent of socket fit - determine if limits patient's ability to ambulate , influences specific parts of gait cycle.

Contralateral Side Involvement / Muscle Strength

→

AKA/BKA
- Compromised sound side-orthopedic or neurological related
- How much time spent inactive as an amputee
- complications of amputation process

→

See Bilateral considerations under "Key Examples"

Note affects of contralateral deficits on proper execution of knee (e.g. step length)
- adjust alignment if needed to compensate.
Note A/P & M/L strength/stabilization (likely myoplasty) and ROM